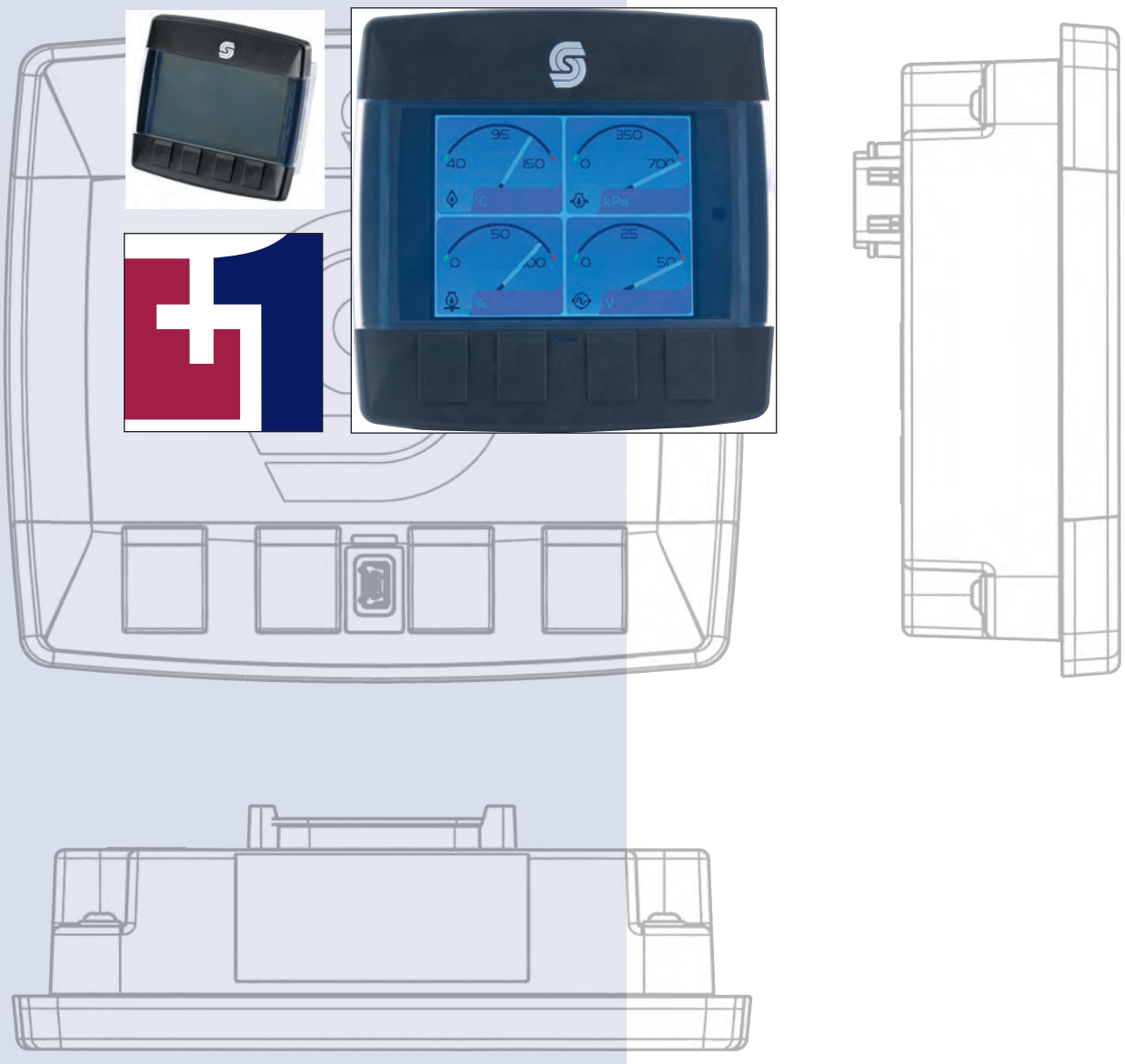
SAUER DANFOSS

PLUS+1™

DP2XX Graphical Display Family Technical Information



Contents

Contents

About This Manual 3
What information is in this manual? 3
What information is in product data sheets? 3
What information is in the DP2XX API specification? 3
What information is in the PLUS+1 GUIDE Software User Manual 3
What information is in the PLUS+1 GUIDE Service Tool User Manual? 3
User Liability and Safety Statements 4
DP2XX Family of Graphical Displays 5
PLUS+1 Graphical Displays Naming Conventions 5
DP200 Model Variants 6
DP210 Model Variants 7
DP250 Model Variants 8
Model Pin Out Overview 9
DP 2XX Input/Output Types 9
DP 210 Input/Output Types 10
    DP210 USB mini-B connector pin assignment 10
DP 250 Input/Output Types 11
USB Connectivity 12
DP250 Connections 12
    DP250 USB mini-B pin assignments 12
    DP250 USB Binder pin assignments 12
Digital/Analog Inputs 13
Input/Output Types and Specifications 13
Multifunction Inputs 15
CAN Shield-Analog Inputs (5V only) 18
Alarm Output 18
CAN/RedCAN Communication 18
Product Ratings 19
Environmental and Testing Specifications 20
IP Ingress Ratings 20
Product Ratings 20
    Mechanical 20
Connecting the DP2XX Display 21
Limiting Crosstalk in Display Screens 22
Visibility and Viewing Radius 22
Installation Drawing 22
Faulty Application Recovery 23
DP2XX Panel Install Dimensions 24
DP2XX Dimensions 24
Operation Considerations 25
Mounting Installation 26
Fastening Installation 26
Accessories 26
DP2XX Accessories 27
Accessories 27
    DP2XX Related Products Part Numbers 27

© 2010 Sauer-Danfoss. All rights reserved.
Sauer-Danfoss accepts no responsibility for possible errors in catalogs, brochures and other printed material. Sauer-Danfoss reserves the right to alter its products without prior notice. This also applies to products already ordered provided that such alterations are not in conflict with agreed specifications. All trademarks in this material are properties of their respective owners. RedCAN™ is a trademark of the Sauer-Danfoss Group. Sauer-Danfoss and the Sauer-Danfoss logotype are trademarks of the Sauer-Danfoss Group.

About This Manual

DP2XX Graphical Display Family Technical Information

This manual is designed to be a comprehensive DP2XX graphical display reference tool for engineering and service personnel. It is one of the five primary sources of PLUS+1 product technical information. The other sources are individual graphical display data sheets, the PLUS+1 GUIDE User Manual, the PLUS+1 GUIDE Service Tool User Manual and relevant API documents.

What information is in this manual?

This manual describes common and variant information for all DP2XX graphical displays. This information contains general specifications, display connector assignments, input and output parameters, environmental ratings and installation details.

What information is in product data sheets?

Parameters that are unique to an individual PLUS+1 graphical display are contained in the graphical display product data sheet. Data sheets contain the following information:

- Numbers and types of inputs and outputs
- Display maximum current capacity
- Display installation drawings
- Display weights
- Product ordering information

What information is in the DP2XX API specification?

This document provides specific information regarding the programming capabilities of the DP2XX display family. Topics include programming variable settings, screen character use, supported PLUS+1 GUIDE components and other helpful information.

What information is in the PLUS+1 GUIDE Software User Manual

Detailed information regarding the PLUS+1 GUIDE software program that is used to build PLUS+1 graphical display applications is contained in the user manual. This technical information manual covers the following broad topics:

- How to use the GUIDE graphical application development tool to create graphical display applications
- How to configure module input and output parameters
- How to download GUIDE applications to target PLUS+1 hardware and display modules

What information is in the PLUS+1 GUIDE Service Tool User Manual?

Detailed information regarding the PLUS+1 GUIDE software program that is used to build PLUS+1 machine management solutions is contained in the user manual. This technical information manual covers the following broad topics:

- How to download GUIDE applications to target PLUS+1 hardware and display modules
- How to upload and download tuning parameters

PLUS+1 literature is available at: www.sauer-danfoss.com

User Liability and Safety Statements

The OEM of a machine or vehicle in which PLUS+1 electronic controls are installed has the full responsibility for all consequences that may occur. Sauer-Danfoss has no responsibility for any consequences (direct or indirect) caused by failures or malfunctions.

- Sauer-Danfoss has no responsibility for any accidents caused by incorrectly mounted or maintained equipment.
- Sauer-Danfoss does not assume any responsibility for PLUS+1 products being incorrectly applied or the system being programmed in a manner that jeopardizes safety.
- All safety critical systems shall include an emergency stop to switch off the main supply voltage for the outputs of the electronic control system. All safety critical components shall be installed in such a way that the main supply voltage can be switched off at any time. The emergency stop must be easily accessible to the operator.
- A system FMEA should be performed on all applications created for the DP2XX series of graphical displays.

DP2XX Family of Graphical Displays

The DP2XX family of graphical displays are designed to provide flexible, expandable, powerful and cost effective total machine management system displays for a wide variety of vehicle applications.

PLUS+1 Graphical Displays Naming Conventions

A	***Model Name***	
	DP200	Grayscale Graphical Display
	DP210	Grayscale Graphical Display with USB
	DP250	Color Graphical Display
B	***Inputs/Outputs (All models have 2 Multifunction Inputs)***	
	00	1 CAN port
	01	1 CAN port, 4 DIN/AIN
	02	1 RedCAN port
	03	1 RedCAN port 2 DIN/AIN
	04	2 CAN ports
	05	User Configurable 2 CAN, 2 DIN/AIN or 1 CAN port, 4 DIN/AIN
	06	User Configurable: 1 RedCAN port, 1 CAN port or 1 RedCAN port, 2 DIN/AIN
	Real Time Clock/ Low Temperature Functionality	
C	**00**	No RTC and LTF
	01	RTC and LTF
D	***Flash Memory/Application Key ****	
	02	2MB without Application Key
	03	2MB with Application Key
	04	16MB without Application Key
	05	16MB with Application Key
***** allows download of Sauer-Danfoss proprietary applications and blocks***		
E	***Application Log***	
	00	None
	04	2MB
	05	16MB
F	***USB Port Type***	
	00	None
	01	USB Device in front
	02	USB Device in rear

DP200 Model Variants

DP200 Model Variants

Model Name	DP200	DP200	DP200	DP200	DP200	DP200
Type	DP200-00-00-02-00-00	DP200-00-01-03-00-00	DP200-01-01-02-00-00	DP200-01-01-03-00-00	DP200-04-01-02-00-00	DP200-04-01-03-00-00
Model Number	10107021	10107380	10106883	10107381	10107022	10107382
Inputs/Outputs	1 CAN 2 Multi*	1 CAN 2 Multi*	1 CAN 4 DIN/AIN 2 Multi*	1 CAN 4 DIN/AIN 2 Multi*	2 CAN 2 Multi*	2 CAN 2 Multi*
Real Time Clock	No	Yes	Yes	Yes	Yes	Yes
Low Temp Functionality	-20°C	- 40°C	- 40°C	- 40°C	- 40°C	- 40°C
Flash	2 MB	2MB	2 MB	2 MB	2 MB	2 MB
Application Key	No	Yes	No	Yes	No	Yes
Application Log	No	No	No	No	No	No
IP Rating	67	67	67	67	67	67
Mounting Bracket	Yes	Yes	Yes	Yes	Yes	Yes
User Manual	No	Yes (CD)	No	No	No	No
Buzzer Output	Yes	Yes	Yes	Yes	Yes	Yes
EIC Software (EIC: Engine Information Control)	No	Yes	No	Yes	No	Yes
RedCAN Relays	No	No	No	No	No	No
Installation Manual	Yes	Yes	Yes	Yes	Yes	Yes

** Multifunction inputs include the following software configurable inputs:* Din/AIN/FreqIN,Rheo, 4–20 mAIN

DP210 Model Variants

DP210 Model Variants

Model Name	DP210	DP210	DP210
Type	DP210-04-01-02-04-01	DP210-04-01-03-04-01	DP210-03-01-02-04-01
Model Number	10106884	10107383	10107975
Inputs/Outputs	2 CAN 2 Multi*	2 CAN 2 Multi*	1RedCAN 2 DIN/AIN 2 Multi*
Real Time Clock	Yes	Yes	Yes
Low Temp Functionality	-40° C	-40° C	-40° C
Flash	2MB	2MB	2MB
Application Key	No	Yes	No
Application Log	2MB	2MB	2MB
IP Rating	54	54	54
Mounting Bracket	Yes	Yes	Yes
User Manual	No	No	No
Buzzer Output	Yes	Yes	Yes
EIC Software	No	Yes	No
RedCAN Relays	No	No	Yes
Installation Manual	Yes	Yes	Yes

** Multifunction inputs include the following software configurable inputs:* Din/AIN/FreqIN, Rheo, 4–20 mAIN

Model Variants

DP250 Model Variants

DP250 Model Variants

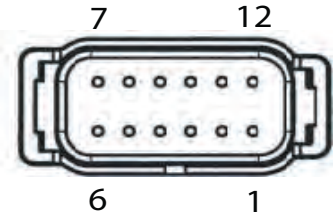
Model Name	DP250	DP250	DP250	DP250	DP250
Type	DP250-00-00-04-00-00	DP250-00-01-05-00-00	DP250-01-01-04-05-00	DP250-01-01-05-05-00	DP250-05-01-04-05-00
Model Number	11080686	11075899	11075900	11077442	11060814
Inputs/Outputs	1 CAN port 2 Multi*	1 CAN 2 Multi*	1 CAN 4 DIN/AIN 2 Multi*	1 CAN 4 DIN/AIN 2 Multi*	2 CAN 2 DIN/AIN 2 Multi* or 1 CAN, 4 DIN/AIN 2 Multi*
Real Time Clock	No	Yes	Yes	Yes	Yes
Low Temp Functionality	-20°C	-30°C	-30°C	-30°C	-30°C
Flash	16MB	16 MB	16MB	16MB	16MB
Application Key	No	Yes	No	Yes	No
Application Log	No	No	Yes	Yes	Yes
IP Rating	67	67	67	67	67
Mounting Bracket	Yes	Yes	Yes	Yes	Yes
User Manual	No	Yes	No	Yes	No
Buzzer Output	Yes	Yes	Yes	Yes	Yes
EIC Software	No	Yes	No	Yes	No
RedCAN Relays	No	No	No	No	No

DP250 Model Variants

Model Name	DP250	DP250	DP250	DP250
Type	DP250-05-01-05-05-00	DP250-06-01-04-05-01	DP250-06-01-05-05-01	DP250-02-01-04-05-02
Model Number	11077443	11060816	11077444	11060919
Inputs/Outputs	2 CAN 2 DIN/AIN, 2 Multi* or 1 CAN, 4 DIN/AIN 2 Multi*	1 RedCAN, 1 CAN 2 Multi* or 1 RedCAN, 2 DIN/AIN, 2 Multi*	1 RedCAN, 1 CAN, 2 Multi* or 1 RedCAN, 2 DIN/AIN, 2 Multi*	1 RedCAN 2 Multi*
Real Time Clock	Yes	Yes	Yes	Yes
Low Temp Functionality	-30°C	-30°C	-30°C	-30°C
Flash	16MB	16MB	16MB	16MB
Application Key	Yes	No	Yes	No
Application Log	Yes	Yes	Yes	Yes
IP Rating	67	54	54	67
Mounting Bracket	Yes	Yes	Yes	Yes
User Manual	Yes	No	Yes	No
Buzzer Output	Yes	Yes	Yes	Yes
EIC Software	Yes	No	Yes	No
RedCAN Relays	No	Yes	Yes	Yes

** Multifunction inputs include the following software configurable inputs:* Din/AIN/FreqIN, Rheo, 4–20 mAIN

Model Pin Out Overview



Deutsch DTM06-12 connector

DP 2XX Input/Output Types

Each DP2XX graphical display has pins that support multiple functions. Pins that support multiple input types are user-configurable using PLUS+1 GUIDE software.

This section provides technical information and specifications for each I/O type.

DP200 Deutsch DTM06-12 Connector Pin Assignments

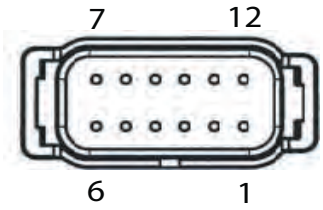
Model Name	DP200	DP200	DP200	DP200	DP200	DP200
Type	DP200-00-00-02-00-00	DP200-00-01-03-00-00	DP200-01-01-02-00-00	DP200-01-01-03-00-00	DP200-04-01-02-00-00	DP200-04-01-03-00-00
Model Number	10107021	10107380	10106883	10107381	10107022	10107382
Pin 1	Pwr Ground (-)	Pwr Ground (-)	Pwr Ground (-)	Pwr Ground (-)	Pwr Ground (-)	Pwr Ground (-)
Pin 2	Pwr Supply (+)	Pwr Supply (+)	Pwr Supply (+)	Pwr Supply (+)	Pwr Supply (+)	Pwr Supply (+)
Pin 3	CAN 0 High	CAN 0 High	CAN 0 High	CAN 0 High	CAN 0 High	CAN 0 High
Pin 4	CAN 0 Low	CAN 0 Low	CAN 0 Low	CAN 0 Low	CAN 0 Low	CAN 0 Low
Pin 5	AIN/ CAN Shield	AIN/ CAN Shield	AIN/ CAN Shield	AIN/ CAN Shield	AIN/ CAN Shield	AIN/ CAN Shield
Pin 6	not used	not used	DIN/AIN	DIN/AIN	not used	not used
Pin 7	not used	not used	DIN/AIN	DIN/AIN	not used	not used
Pin 8	not used	not used	DIN/AIN	DIN/AIN	CAN 1 High	CAN 1 High
Pin 9	not used	not used	DIN/AIN	DIN/AIN	CAN 1 Low	CAN 1 Low
Pin 10	Multi Input*	Multi Input*	Multi Input*	Multi Input*	Multi Input*	Multi Input*
Pin 11	Multi Input*	Multi Input*	Multi Input*	Multi Input*	Multi Input*	Multi Input*
Pin 12	Buzzer Out	Buzzer Out	Buzzer Out	Buzzer Out	Buzzer Out	Buzzer Out

** Multifunction inputs include the following software configurable inputs:* Din/AIN/FreqIN, Rheo, 4–20 mAIN

Above pinouts are for device pins.

Use care when wiring mating connector.

DP 210 Input/Output Types

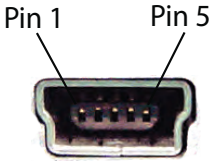


Deutsch DTM06-12 connector

DP 210 Deutsch DTM06-12 Pin Assignments

Model Name	DP210	DP210	DP210
Type	DP210-04-01-02-04-01	DP210-04-01-03-04-01	DP210-03-01-02-04-01
Model Num.	10106884	10107383	10107975
Pin 1	Pwr Ground (-)	Pwr Ground (-)	Pwr Ground (-)
Pin 2	Pwr Supply (+)	Pwr Supply (+)	Pwr Supply(+)
Pin 3	CAN 0 High	CAN 0 High	CAN 0 High
Pin 4	CAN 0 Low	CAN 0 Low	CAN 0 Low
Pin 5	AIN/CAN Shield	AIN/CAN Shield	AIN/CAN Shield
Pin 6	Not used	Not used	RedCAN 0 High
Pin 7	Not used	Not used	RedCAN 0 Low
Pin 8	CAN 1	CAN 1 High	DIN/AIN
Pin 9	CAN 1 Low	CAN 1 Low	DIN/AIN
Pin 10	Multi Input*	Multi Input*	Multi Input*
Pin 11	Multi Input*	Multi Input*	Multi Input*
Pin 12	Buzzer Out	Buzzer Out	Buzzer Out

** Multifunction inputs include the following software configurable inputs:* Din/AIN/FreqIN, Rheo, 4–20 mAIN



USB mini-b connector

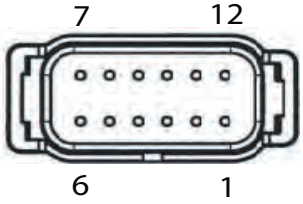
DP210 USB mini-B connector pin assignment

Pin 1	Vbus
Pin 2	Data -
Pin 3	Data +
Pin 4	NC
Pin 5	Ground

USB functionality is intended only for use with the PLUS+1 GUIDE Service Tool application. USB use is supported in PLUS+1 GUIDE Service Tool versions 4.0 and later.

DP250 Connections

DP 250 Input/Output Types



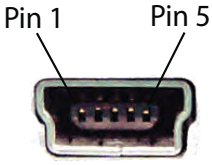
DP250 Deutsch DTM06-12 pin assignments

Model Name	DP250	DP250	DP250	DP250	DP250
Type	DP250-00-00-04-00-00	DP250-00-01-05-00-00	DP250-01-01-04-05-00	DP250-01-01-05-05-00	DP250-05-01-04-05-00
Model Num.	11080686	11075899	11075900	110770442	11060814
Pin 1	Pwr Ground (-)	Pwr Ground (-)	Pwr Ground (-)	Pwr Ground (-)	Pwr Ground (-)
Pin 2	Pwr Supply (+)	Pwr Supply (+)	Pwr Supply (+)	Pwr Supply (+)	Pwr Supply (+)
Pin 3	CAN 0 High	CAN 0 High	CAN 0 High	CAN 0 High	CAN 0 High
Pin 4	CAN 0 Low	CAN 0 Low	CAN 0 Low	CAN 0 Low	CAN 0 Low
Pin 5	AIN/CAN Shield	AIN/CAN Shield	AIN/CAN Shield	AIN/CAN Shield	AIN/CAN Shield
Pin 6	Not used	Not used	DIN/AIN	DIN/AIN	DIG/AIN
Pin 7	Not used	Not used	DIN/AIN	DIN/AIN	DIG/AIN
Pin 8	Not used	Not used	DIN/AIN	DIN/AIN	DIN/AIN/5V REFOUT CAN High
Pin 9	Not used	Not used	DIN/AIN	DIN/AIN	DIN/AIN/ CAN Low
Pin 10	Multi Input*	Multi Input*	Multi Input*	Multi Input*	Multi Input*
Pin 11	Multi Input*	Multi Input*	Multi Input*	Multi Input*	Multi Input*

Model Name	DP250	DP250	DP250	DP250
Type	DP250-05-01-05-05-00	DP250-06-01-04-05-01	DP250-06-01-05-05-01	DP250-02-01-04-05-02
Model Num.	11077443	11060816	11077444	11060919
Pin 1	Pwr Ground (-)	Pwr Ground (-)	Pwr Ground (-)	Pwr Ground (-)
Pin 2	Pwr Supply (+)	Pwr Supply (+)	Pwr Supply (+)	Pwr Supply (+)
Pin 3	CAN 0 High	CAN 0 High	CAN 0 High	CAN 0 High
Pin 4	CAN 0 Low	CAN 0 Low	CAN 0 Low	CAN 0 Low
Pin 5	A/CAN Shield	AIN/CAN Shield	AIN/CAN Shield	AIN/CAN Shield
Pin 6	DIN/AIN	RedCAN 0 High	RedCAN 0 High	RedCAN 0 High
Pin 7	DIN/AIN	RedCAN 0 Low	RedCAN 0 Low	RedCAN 0 Low
Pin 8	DIN/AIN/ 5V REFOUT CAN 1 High	DIN/AIN/ 5V REFOUT CAN 1 High	DIN/AIN/ 5V REFOUT CAN 1 High	5V REFOUT
Pin 9	DIN/AIN/ CAN 1 Low	DIN/AIN/ CAN 1 Low	DIN/AIN/ CAN 1 Low	Not used
Pin 10	Multi Input*	Multi Input*	Multi Input*	Multi Input*
Pin 11	Multi Input*	Multi Input*	Multi Input*	Multi Input*
Pin 12	Buzzer Out	Buzzer Out	Buzzer Out	Buzzer Out

** Multifunction inputs include the following software configurable inputs:* Din/AIN/FreqIN, Rheo, 4–20 mAIN

USB Connectivity



USB mini-b connector

DP250 USB mini-B pin assignments

Pin1	Vbus
Pin 2	Data -
Pin 3	Data +
Pin 4	NC
Pin 5	Ground

USB functionality is intended only for use with the PLUS+1 GUIDE Service Tool application. USB use is supported in PLUS+1 GUIDE Service Tool versions 4.0 and later.

Binder Series 702 USB Connector

DP250 USB Binder pin assignments

1	USB Device Vbus output
2	USB Device D+
3	USB Device D+
4	USB Device GND
5	Not Used
6	Not Used
7	Not Used
8	Not Used

Inputs

DP2XX Series Displays support the following pin types:

- Digital or Analog (DIN/AIN)
- Multifunction (Din/AIN/FreqIN, Rheo, 4–20 maIN)
- Analog or Temperature or Rheostat (AIN/Temp/Rheo)
- Fixed Range Analog or CAN shield (AIN/CAN shield)

Each input pin allows one of the above functional types. For pins with multiple functions, input configurations are user programmable using PLUS+1 GUIDE templates.

For all input types, the following specification is applicable.

Digital/Analog Inputs

Low Level Digital Input

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Voltage Range	V	0	5.5	—	—
Input Resistance	kΩ	—	—	233 no pull up/down 14 With pull-up to 5V 14 Pull-down to ground 7.3 With pull-up and down to 5V	
Programmable Low Threshold Voltage	V	0	5.5	—	—
Programmable High Threshold Voltage	V	0	5.5	—	—
Rise time	µs	—	—	10	—
Fall Time	µs	—	—	10	—

Low Level Analog Input

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Voltage Range	V	0	5.5	—	—
Input Resistance	kΩ	—	—	233 no pull up/down 14 With pull-up to 5V 14 Pull-down to ground 7.3 With pull-up and down to 5V	
Analog Voltage Error	mV	—	—	± 20 ± 107	Uin = 0V Uin = 5V
Bandwidth	kHz		—	12	—

Digital/Analog Inputs

High Level Digital Input

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Voltage Range	V	0	70	—	—
Input Resistance	kΩ	—	—	105 no pull up/down 13 With pull-up to 5V 13 Pull-down to ground 7 With pull-up and down to 5V	
Programmable Low Threshold Voltage	V	0	70	—	—
Programmable High Threshold Voltage	V	0	70	—	—
Rise time	µs	—	—	10	—
Fall Time	µs	—	—	10	—

High Level Analog Input

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Voltage Range	V	0	70	—	—
Input Resistance	kΩ	—	—	105 no pull up/down 13 With pull-up to 5V 13 Pull-down to ground 7 With pull-up and down to 5V	
Analog Voltage Error (± 300mV+ U_{in} x 3.4%)	mV	—	—	± 100 U_{in} = 0V ± 2700 U_{in} = 70V	
Bandwidth	kHz	—	—	13	—

Multifunction Inputs

Low Level Digital Input

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Voltage Range	V	0	5.5	—	—
Input Resistance	kΩ	—	—	233 no pull up/down 14 With pull-up to 5V 14 Pull-down to ground 7.3 With pull-up and down to 5V	
Programmable Low Threshold Voltage	V	0	5.5	—	—
Programmable High Threshold Voltage	V	0	5.5	—	—
Rise Time	µs	—	—	10	—

Low Level Analog Input

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Voltage Range	V	0	5.5	—	—
Input Resistance	kΩ	—	—	233 no pull up/down 14 With pull-up to 5V 14 Pull-down to ground 7.3 With pull-up and down to 5V	
Analog Voltage Error	mV	—	—	± 7 U_{in} = 0V ± 107 U_{in} = 5V	
Bandwidth	kHz		—	12	—

Multifunction Inputs

High Level Digital Input

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Voltage Range	V	0	70	—	—
Input Resistance	kΩ	—	—	105 no pull up/down 13 With pull-up to 5V 13 Pull-down to ground 7 With pull-up and down to 5V	
Programmable Low Threshold Voltage	V	0	70	—	—
Programmable High Threshold Voltage	V	0	70	—	—
Rise time	µs	—	—	10	—
Fall Time	µs	—	—	10	—

High Level Analog Input

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Voltage Range	V	0	70	—	—
Input Resistance	kΩ	—	—	105 no pull up/down 13 With pull-up to 5V 13 Pull-down to ground 7 With pull-up and down to 5V	
Analog Voltage Error (± 300mV+ U_{in} x 3.4%)	mV	—	—	± 100 U_{in} = 0V ± 2700 U_{in} = 70V	
Bandwidth	kHz	—	—	13	—

Multifunction Inputs

Resistance Input

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Resistance Range	k Ω	0	10	—	—
Input Resistance		—	1.33	—	Pull up to 5V
Resistance Error	Ω	—	±1 ±201	—	R = 0kΩ R = 10kΩ

Current Input

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Current Range	—	0	25	—	Shut off at 28 mA
Input Resistance	Ω	—	—	100	2.0V at 20 mA Input current
Current Error (± 3.5%)	mA	—	± 0.1 ± 0.8	—	I_{in} = 0 mA I_{in} = 20 mA

Frequency Input

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Frequency Range	kHz	0	10	—	—

Positive Duty Input

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Positive Duty Cycle Range	%	0.01	100	—	—

Count Input

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Count Range	Count s	0	65536	—	—

Quad Count Input

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Count Range	Count s	0	± 3276/8	—	—

CAN Shield-Analog Inputs (5V only)

CAN Shield

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Input Impedance	—	—	—	1µF+1Ω	—

Analog Input (5V only)

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Voltage Range	V	0	5.5		—
Input resistance	kΩ	—	—	233	—
Analog Voltage Error ± (20mV+U_{in} x 1.6 %)	mV	—	± 7 ± 107	—	Uin = 0V Uin = 5V
Bandwidth	kHz	—	—	2.8	—

Alarm Output

Alarm Output

Description	*Min Value*	*Max Value*	*Unit*	*Comment*
Current	*0*	*1*	*A*	—
Short circuit current	—	*2*	*A*	—
Short circuit current peak	—	*8*	*A*	—
Saturation voltage	—	*1*	*V*	At 1 A
Current measurement	*0*	*2*	*A*	—
Current measurement error	—	± 60 ±75	mA	0A 1A

CAN/RedCAN Communication

CAN-RedCAN DP200, DP210

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Available Baud Rates	kbps	0.01	100	111.111 125 250 500 1000	With 120 Ω termination
Maximum Input Voltage Range	V	–27	40	—	—

CAN-RedCAN DP200, DP250

Description	*Unit*	*Minimum*	*Maximum*	*Typical*	*Comment*
Available Baud Rates	kbps	0.01	100	111.111 125 250 500 1000	With 120 Ω termination
Maximum Input Voltage Range	V	0	70	—	—

Power

Supply Voltage/Maximum Current Ratings

DP2XX graphical displays are designed to operate with a nominal 9–63 Vdc power supply with reverse polarity protection.

Supply Voltage

Description	*Unit*	*DP200 DP210 Min*	*DP250 Min*	*Maximum*	*Comment*
DC Supply Voltage	Volt	9	9	63	With reverse polarity protection
DC Supply Current (circuit board only)	mA	—		2.5 30 70 40	Ubat = 8V UBat =14V UBat = 28V Ubat = 70V
Heater	W	3.6 W	5 W at 0° 10 W at - 40°	—	DP250 heater current consumption is temperature dependent.
Power Supply Interruption (without rebooting)	ms	30 35 55 140	34 36 46 100	N/C	According to ISO 7637-2
Load dump protection, 28V systems, % pulses, Cycle time 100 s, Criteria C	V Ω ms ms	200 3 200 10	183 3 200 10	—	According to ISO 7637-2
Auto Heater Shut Off	Degree Celcius	—	—	—	Auto over temp protection- heater shuts off when not needed
5V Reference Output	V	4.75	4.75	5.25	—

5V Reference Output

Description	*Unit*	*Minimum*	*Maximum*
Output Voltage	V	4.75	5.25
Output Current	A	0.5	—
Output Short Circuit	A	—	1
Short circuit Protection	V	0	70

USB Input/Output Parameters

Description	*Unit*	*Minimum*	*Typical*	*Maximum*	*Comment*
2.0 Full Speed	Mbit/s	—	12	—	—
Vbus Input Voltage	Volt	4.75		5.25	—
Vbus Input Resistance	k Ω	3.6	47	—	—
Short Circuit Protection (No Damage)	V	0	—	70	—
Vbus Output Voltage	V	4.75	—	5.25	—
VbusOutput Current	A	0.5	—	—	—
Vbus Short Current	A	—	—	1	—

Environmental and Testing Specifications

Climatic

Condition	Rating
Cold, heat storage and operation	IEC 60068-2-1, IEC 60068-2-2
Fogging	IEC 60068-
Temperature change	IEC 60068-2-30
Moisture ingress	IEC 60529
Sunlight visibility	IEC 68-2-5

Chemical

Condition	Rating
Chemical resistance	ISO 16750-5

Mechanical

Condition	Rating
Vibration, resonance	IEC 60068-2-6
Vibration, operation	IEC 60068-2-64
Bump	IEC 60068-2-29
Shock	IEC 60068-2-27
Free fall	IEC60068-2-32

IP Ingress Ratings

⚠ Caution:
All DP2XX displays (except USB in Front model) carry an IP67 ingress rating. Note that the rear USB mating connector or seal plug must be in place for full IP67 protection.

⚠ Caution:
The DP2XX models with a front mini USB option have an ingress rating of IP54 and are recommended for in-cab installation only. Note that the USB mating connector or seal plug must be in place for full IP54 protection.

Connecting the DP2XX Display

Mating Connectors

PLUS+1 graphical displays use Deutsch connectors. Sauer Danfoss has assembled a mating connector kit, referred to as a bag assembly. Mating connector bag assembly ordering information is found in the product data sheet for each module.

Product Installation

Recommended Machine Wiring Guidelines

1. All wires must be protected from mechanical abuse. Wires should be run in flexible metal or plastic conduits.
2. Use 85° C [185° F] wire with abrasion resistant insulation. 105°C [221°F] wire should be considered near hot surfaces.
3. Use a wire size that is appropriate for the module connector.
4. Separate high current wires such as solenoids, lights, alternators, or fuel pumps from sensor and other noise-sensitive input wires.
5. Run wires along the inside of, or close to, metal machine surfaces where possible. This simulates a shield which will minimize the effects of EMI/RFI radiation.
6. Do not run wires near sharp metal corners. Consider running wires through a grommet when rounding a corner.
7. Do not run wires neat hot machine members.
8. Provide strain relief for all wires.
9. Avoid running wires near moving or vibrating components.
10. Avoid long, unsupported wire spans.
11. All analog sensors should be powered by the sensor power source from the graphical display and ground returned to the sensor ground pin on the display.
12. Sensor lines should be twisted about one turn every 10 cm [4 in].
13. It is better to use wire harness anchors that will allow wires to float with respect to the machine rather than rigid anchors.

Welding on a machine equipped with a PLUS+1 graphical display

The following procedures are recommended when welding on a machine equipped with a PLUS+1 graphical display:

- The engine should be off.
- Disconnect the negative battery cable from the battery.
- Do not use electrical components to ground the welder. Clamp the ground cable for the welder to the component that will be welded as close to possible to the weld.

Limiting Crosstalk in Display Screens

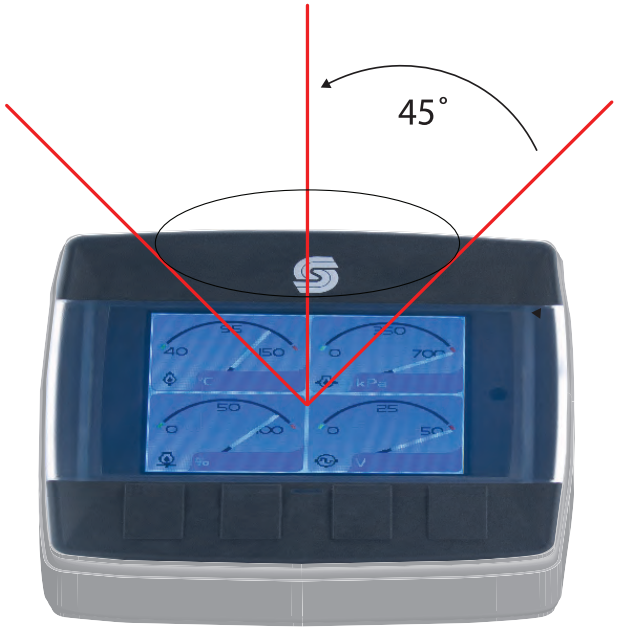
Due to the general characteristics of the grayscale DP2XX Series display, the display may contain faint shadow-like images. This is called crosstalk, a common occurrence in LCD displays. This is a result of pixel interference due to the constraints of the LCD design.

Crosstalk is very pattern-dependent. It may or may not occur, it is dependent on the actual images used and the placement of the images within the display. If multiple grayscale images are used, ensure that they are as small as possible and not placed in the same vertical position. Also, try to avoid using both black and white and grayscale images in the same vertical position.

Contrast and backlight controls can be used in some cases to help counteract crosstalk ghosting. If there are bright lines in dark area; the contrast is set too low. Adjust backlight intensity to enhance visibility.

Visibility and Viewing Radius

Due to the display nature of the TFT-LCD screen, the optimal viewing angle for the DP2XX display is at a maximum radius of 45° from either side of the screen.

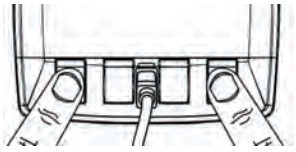


Faulty Application Recovery

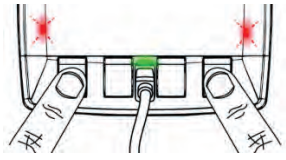
The boot loader is always executed when the unit is powered. The boot loader checks if the application have the completely downloaded flag set and in that case starts to execute it after a delay of 200 ms. The delay give an opportunity for the PLUS+1 GUIDE Service Tool to prevent the call to the application. This allows a non functional application to be replaced by the boot loader. This recovery function is activated by the Communication>Recover ECU menu in the PLUS+1 GUIDE Service Tool.

USB communication requires more time than 200 ms to be established. The units with USB have therefore a function to force a recovery mode entry when the USB channel is used.
The procedure to activate this function follows below:

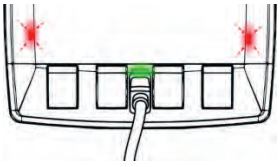
1. Connect the USB cable to the PC and the unit.
2. Start the service tool and select the Display as the communication gateway.



3. Depress the leftmost and the rightmost push button before the unit is powered.

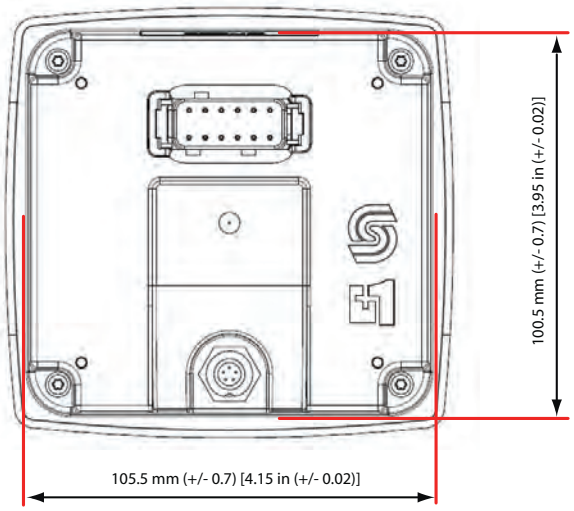


4. Apply power to the unit with the push buttons depressed.



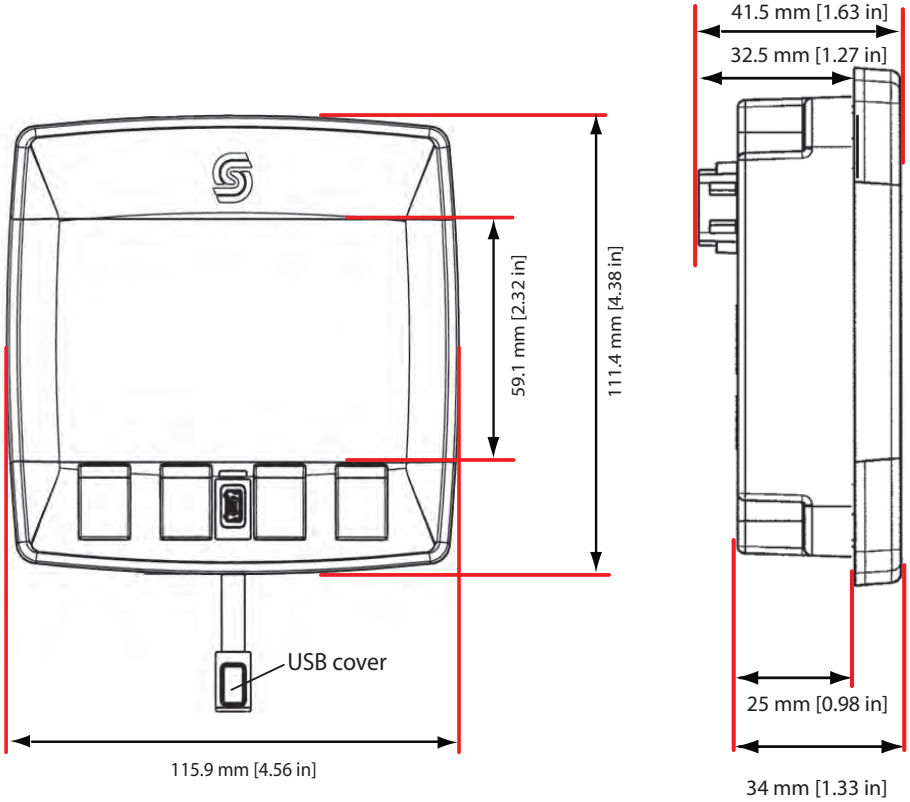
5. Release the push buttons when the LED above the USB receptacle is lit. The unit will now stay to execute the boot loader and allow the application program to be replaced.

DP2XX Panel Install Dimensions



Caution:
Oversized panel cutouts may jeopardize product IP rating.

DP2XX Dimensions



- Gasket seal area crosshatched
- Panel thickness: 2-5 mm

Operation Considerations

• Disconnect your machine's battery power before connecting power and signal cables to the display.

• Before doing any electrical welding on your machine, disconnect all power and signal cable cables connected to the display

• Do not exceed the display power supply voltage ratings. Using higher voltages may damage the display and can create a fire or electrical shock hazard.

• Do not use or store the display where flammable gases or chemicals are present. Using or storing the display where flammable gases or chemicals are present may cause an explosion.

• Software configures the keypad buttons on the display. Do not use these buttons to implement critical safety features. Use separate mechanical switches to implement critical safety features such as emergency stops.

• Design systems that use the display so that a communication error or failure between the display and other units cannot cause a malfunction that might injure people or damage material.

• The protective glass over the display screen will break if hit with a hard or heavy object. Install the display to reduce the possibility of it being hit by hard or heavy objects.

• Storing or operating a display in an environment that exceeds the display specified temperature or humidity rating may damage the display.

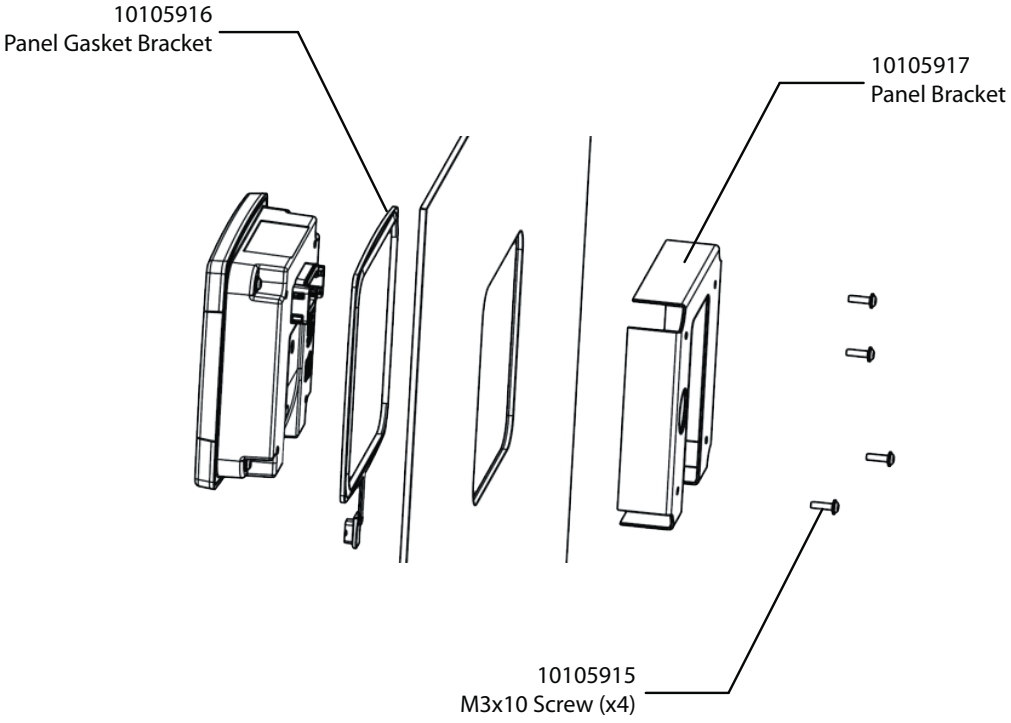
• Always clean the display with a soft, damp cloth. Use a mild dishwashing detergent as needed. To avoid scratching and discoloring the display, do not use abrasive pads, scouring powders, or solvents such as alcohol, benzene, or paint thinner.

• The display is not user serviceable. Return the display to the factory in case of failure.

• DP2XX display units are designed to provide machine information. Due to graphical updating variables, DP2XX displays are not compatible with real time control.

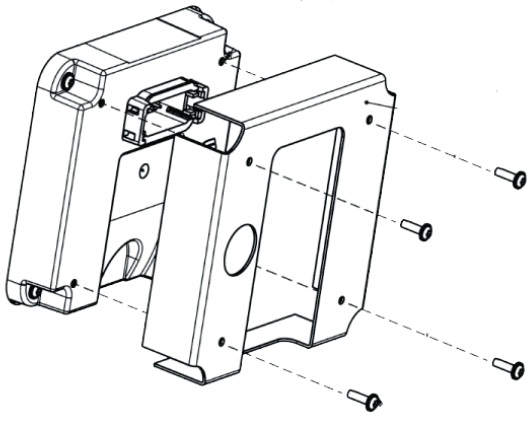
Mounting Installation

Suggested mounting procedure



Fastening Installation

Mounting screw placement



⚠ Caution:
Excessive screw torque force may cause damage to housing.

⚠ Caution:
: Reassembly with self-tapping screws may damage existing threads in housing.

Mounting and fastening Installation

- Fastening hole depth: 11 mm
- May be threaded M3 and used with standard screws.
- Maximum torque: 0.9 Nm. Excessive torque force may cause damage to housing.
- Use of non-recommended screws may cause damage to housing

DP2XX Accessories

DP2XX Related Products Part Numbers

online	*J1939 CAN EIC Engine Monitor Software*
10102025	*Deutsch Mating Connector Bag Assembly, solid (20–24 AWG)*
10100944	*Deutsch Mating Connector Bag Assembly, stamped (16–20 AWG)*
10103497	*Binder Connector and Cable Kit (Series 702)*

Connection Tools

10100744	*Deutsch stamped contacts terminal crimp tool, size 20*
10100745	*Deutsch solid contacts terminal crimp tool*

DP2XX Mounting Kit

10107354	*DP2XX Mounting Hardware Kit*
11079236	*Optional DP2XX Panel Mounting Kit*

Software

10101000	*PLUS+1 GUIDE Application Software (Including Service Tool and Screen Editor)*

SAUER DANFOSS

Products we offer:

- Bent Axis Motors
- Closed Circuit Axial Piston Pumps and Motors
- Displays
- Electrohydraulic Power Steering
- Electrohydraulics
- Hydraulic Power Steering
- Integrated Systems
- Joysticks and Control Handles
- Microcontrollers and Software
- Open Circuit Axial Piston Pumps
- Orbital Motors
- PLUS+1™ GUIDE
- Proportional Valves
- Sensors
- Steering
- Transit Mixer Drives

Members of the Sauer-Danfoss Group:

Comatrol
www.comatrol.com

Schwarzmüller-Inverter
www.schwarzmueller-inverter.com

Turolla
www.turollaocg.com

Valmova
www.valmova.com

Hydro-Gear
www.hydro-gear.com

Sauer-Danfoss-Daikin
www.sauer-danfoss-daikin.com

Sauer-Danfoss is a global manufacturer and supplier of high-quality hydraulic and electronic components. We specialize in providing state-of-the-art technology and solutions that excel in the harsh operating conditions of the mobile off-highway market. Building on our extensive applications expertise, we work closely with our customers to ensure exceptional performance for a broad range of off-highway vehicles.

We help OEMs around the world speed up system development, reduce costs and bring vehicles to market faster.
Sauer-Danfoss – Your Strongest Partner in Mobile Hydraulics.

Go to www.sauer-danfoss.com for further product information.

Wherever off-highway vehicles are at work, so is Sauer-Danfoss.

We offer expert worldwide support for our customers, ensuring the best possible solutions for outstanding performance. And with an extensive network of Global Service Partners, we also provide comprehensive global service for all of our components.

Please contact the Sauer-Danfoss representative nearest you.

Local address:

Sauer-Danfoss (US) Company
2800 East 13th Street
Ames, IA 50010, USA
Phone: +1 515 239 6000
Fax: +1 515 239 6618

Sauer-Danfoss ApS
DK-6430 Nordborg, Denmark
Phone: +45 7488 4444
Fax: +45 7488 4400

Sauer-Danfoss GmbH & Co. OHG
Postfach 2460, D-24531 Neumünster
Krokamp 35, D-24539 Neumünster, Germany
Phone: +49 4321 871 0
Fax: +49 4321 871 122

Sauer-Danfoss-Daikin LTD.
Shin-Osaka TERASAKI 3rd Bldg. 6F
1-5-28 Nishimiyahara, Yodogawa-ku
Osaka 532-0004, Japan
Phone: +81 6 6395 6066
Fax: +81 6 6395 8585

www.sauer-danfoss.com